**Isidus moreli** Mulsant et Rey, 1874 in Sicily (Elateridae Pomachiliini): regional distribution and threat factors

Calogero Muscarella 1,5,*, Simone Costa 1, Francesco Paolo Faraone 2, Giuseppe Salemi 3, Daniele Sechi 4 & Gabriele Giacalone 1 2

1Cooperativa Silene, Via D’Ondes Reggio 8a, 90127 Palermo, Italy
2Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (STEBICEF)
University of Palermo, Via Archirafi 18, 90123 Palermo, Italy
3WWF Italia Via Roma, 156/D, Siculiana (AG), Italy
4Via Francesco Cocco Ortu, 75, 09128 Cagliari, Italy
*Corresponding author

**ABSTRACT**

The distribution of *Isidus moreli* Mulsant et Rey, 1874 (Elateridae Pomachiliini) in Sicily is updated, a saproxylophagous species linked to dune environments and considered “Vulnerable” in the national red lists and “Near Threatened” in the European ones. For this species, the ecological peculiarities are also highlighted and the main threat factors are discussed, underlining the importance of protected areas for its conservation.

**KEY WORDS**

Elateridae; distribution; Sicily; endangered species.

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**INTRODUCTION**

*Isidus* Mulsant & Rey, 1874 is a genus of Elateridae belonging to the tribes Pomachiliini. This tribe lists four Palearctic species, three of which are also present in the Mediterranean area: *I. appendiculatus* (Pic, 1912), *I. letourneuxi* (Pic, 1902) and *I. moreli* (Mulsant et Rey, 1874) (Cate, 2007; Alonso-Zarazaga & Cate, 2010). *Isidus moreli*, a species with Turanian-Mediterranean chorotype, is widespread in France, Italy, Malta, Spain, Ukraine, Morocco, Tunisia, Algeria, Egypt, Cyprus and Turkey (Leseigneur, 1972; Platia, 1994; Cate, 2007; Delnatte, 2010; Alonso-Zarazaga & Cate, 2023).

Only about twenty locations are known for Italy (Platia, 1994, 2005); of these, the only ones indicated for Sicily are Casabianca, a coastal area located about 10 km north of Messina (Baviera & Platia, 2018) and the mouth of the Simeto River near Catania (Altadonna, 2015). However, Pulvirenti & Platia (2022) indicate its presence in the provinces of Trapani, Agrigento, Ragusa and Messina but without providing its precise location.

Knowledge on the ecology of this species have been provided by Leseigneur (1972), Giordani Soika (1992) and Platia (1994) while the species has been studied in detail by Delnatte (2010). The pre-imaginal stages are saproxylophagous and develop mainly in large strains of *Platanus* and *Populus* in advanced state of decomposition which are found on beaches near the river mouths. Here, the larvae colonize the part of the wood directly in contact with the sandy substrate and can move between the roots of the dune plants through different microhabitat.
Isidus moreli show a marked opportunistic and predatory behaviour by preferably attacking larvae of other saproxylophagous beetles, with a specific preference towards Curculionidae Cossoninae and can integrate their diet by also feeding on wooden compounds, fungi or organic debris. Similarly to other predatory Elateridae (Kozlov et al., 2020) cannibalism is observed in the larvae of this species. Larval development is between 3 and 4 years, adults emerge between June and August and are active from late in the evening and throughout the night after which they take refuge in the sand. The adults are photophilous (Contarini, 1992; Delnatte, 2010). Isidus moreli is extremely important for conservationist reasons because it is associated with intact coastal habitats and is an excellent bioindicator of the conservation status of the biocenoses of the sandy coasts of the Mediterranean area (Audisio et al., 2003; Jaulin & Soldati, 2003, 2005; Fattorini, 2008). Due to the fragmentation of its range and the degradation of its habitat, it is considered Vulnerable (VU) in the IUCN Red List of Italian saproxylic beetles (Audisio et al., 2014) and Near Threatened (NT) in the European Red List of Saproxylic Beetles (Calix et al., 2018). During some sampling carried out in the sandy coastal areas of Sicily in order to survey the faunal component, various populations of I. moreli were identified. The new data presented here therefore allow us to significantly extend its regional range.

MATERIAL AND METHODS

Study area

The sampling was carried out in 13 Sicilian coastal locations between 2019 and 2023 (Table 1, Fig. 1), focusing on sites of potential presence of the species, i.e. intact dune environments and near the river mouths.

Sampling

Adults of I. moreli were attracted with light traps consisting of a white sheet placed on the ground and illuminated with a 20 Watt black light lamp (Wood light) and a 10 Watt cold white light lamp (color temperature 6500 degrees Kelvin) powered by 20,000 mha lithium batteries. This system was joined by another consisting of a white umbrella illuminated by a 10 watt UV LED with an emission frequency between 390 and 405 nm. Information on the presence of the species was also

Figure 1. Isidus moreli in Sicily. The locaties where its presence has been confirmed are marked in red, those cited only in the literature are marked in yellow and the locaties already reported where the species has not been found are marked in green.
obtained by inspecting decaying trunks or by collecting elytra or fragments of specimens found in the field. The specimens were identified following Pesarini (1986) and Platia (1994) and, unless otherwise indicated, preserved in the authors’ collections.

ABBREVIATIONS. C. Muscarella collection, Palermo, Italy: CM; D. Sechi collection Cagliari, Italy: CS; G. Altadonna collection, Tramestieri (ME), Italy: CA.

RESULTS

Isidus moreli Mulsant et Rey, 1874

REPORTS. ITALY • 1 specimen, Trapani: Castelvetrano, foce del Modione, 37.583253°, 12.819380°, 17 Jun. 2021 (CM); 4 specimens, ibidem, 16 Jun. 2022 (CS); 1 specimen, ibidem, 18 Jun. 2022, legit F.P. Faraone (CM); 1 specimen, ibidem, 7 Jul. 2022 (CM); 2 specimens, Castelvetrano: foce del Belice,
These are the locations on the island where the coastal dune system, although fragmented and constantly threatened, still has large strips of relatively intact beaches (Lapiana & Sparacio, 2010). This is made possible thanks to the system of Natural Reserves falling within the network of SACs (Special Protection Areas) or the ecological network for the conservation of European biodiversity established pursuant to Directive 92/43/EEC “Habitats” to guarantee the maintenance of natural habitats and species of flora and fauna that are threatened or rare at Community level.

8 out of 11 sites in which the presence of *I. moreli* is confirmed fall within this network, while the investigations carried out in 3 sites potentially suitable for the presence of the species in north-western Sicily have provided negative results.

**DISCUSSION**

*Isidus moreli* is a predominantly saproxylic stenocic species linked to well preserved coastal dunes and an extremely specialized microhabitat, decaying wood. The space-time presence of this resource, in an over-exploited ecosystem such as the coastal fringe, is severely limited, therefore posing the serious problem of its medium-long term survival.

<table>
<thead>
<tr>
<th>Province</th>
<th>Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palermo</td>
<td>Termini Imerese, foce del Torto</td>
<td>37°58'21.76&quot;N</td>
<td>13°46'16.48&quot;E</td>
<td>—</td>
</tr>
<tr>
<td>Palermo</td>
<td>Balestrate, foce del Calatubo</td>
<td>38°2'26.56&quot;N</td>
<td>12°58'46.76&quot;E</td>
<td>—</td>
</tr>
<tr>
<td>Trapani</td>
<td>Castellamare, foce San Bartolomeo</td>
<td>38°1'29.64&quot;N</td>
<td>12°54'29.00&quot;E</td>
<td>—</td>
</tr>
<tr>
<td>Trapani</td>
<td>Castelvetrano, foce Modione</td>
<td>37°34'59.72&quot;N</td>
<td>12°49'9.79&quot;E</td>
<td>Yes</td>
</tr>
<tr>
<td>Trapani</td>
<td>Castelvetrano, foce Belice</td>
<td>37°34'57.31&quot;N</td>
<td>12°51'59.34&quot;E</td>
<td>Yes</td>
</tr>
<tr>
<td>Agrigento</td>
<td>Ribera, foce del Platani</td>
<td>37°23'48.33&quot;N</td>
<td>13°16'15.71&quot;E</td>
<td>Yes</td>
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<tr>
<td>Agrigento</td>
<td>Siculiana Marina, Torre Salsa</td>
<td>37°21'37.56&quot;N</td>
<td>13°20'40.79&quot;E</td>
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<td>Caltanissetta</td>
<td>Marina di Butera, foce Rizzuto</td>
<td>37°6'16.26&quot;N</td>
<td>14°6'38.47&quot;E</td>
<td>Yes</td>
</tr>
<tr>
<td>Ragusa</td>
<td>Marina di Ragusa, foce Irminio</td>
<td>36°46'22.72&quot;N</td>
<td>14°35'43.03&quot;E</td>
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<tr>
<td>Ragusa</td>
<td>Sampieri, foce Petraro</td>
<td>36°43'10.50&quot;N</td>
<td>14°45'4.13&quot;E</td>
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<td>Ragusa</td>
<td>Santa Maria del Focallo</td>
<td>36°43'3.61&quot;N</td>
<td>14°55'26.01&quot;E</td>
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<td>Siragusa</td>
<td>Noto, foce Tellaro</td>
<td>36°50'16.14&quot;N</td>
<td>15°6'20.72&quot;E</td>
<td>Yes</td>
</tr>
<tr>
<td>Catania</td>
<td>Catania, foce Simeto</td>
<td>37°23'55.78&quot;N</td>
<td>15°5'19.96&quot;E</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 1. Stations sampled in Sicily whose presence is confirmed. Sites falling within Special Protection Areas (SAC) are in bold.
conservation. The main threat factor is, in general, the compromise of its elective habitat, i.e. the coastal habitats already included in Annex I of Directive 92/43/EEC “Habitats” (macrocategor 22: Maritime dunes of the Mediterranean coasts). From the national reports on the state of conservation of priority habitats carried out by ISPRA, it emerges that in Italy coastal habitats are currently among the most threatened, with 40% in an inadequate state of conservation and 46.7% in a state of bad conservation (Biondi & Zivkovic, 2014; Acosta & Ercole, 2015). The situation, if possible, is even more serious in Sicily, particularly on the north-western coastal side (Lapiana & Sparacio, 2010) where the anthropic impact has led to the rarefaction and sometimes to the local extinction of various insect taxa (Lapiana & Sparacio, 2008; Muscarella et al., 2002a, 2002b; Sparacio et al., 2023). The main pressures in these environments are related to anthropic exploitation, in particular to activities connected directly or indirectly with seaside tourism (coastal roads, development of tourist facilities and residential areas, cleaning of the beaches with mechanical means and beach leveling, trampling, landfills, transit of vehicles on dunes), but also to other modifications of natural balances (drainages, artificial coastal defense works, extraction of materials, etc.) (Acosta & Ercole, 2015; Angelini et al., 2021). In Sicily the main threat factor of Isidus moreli seems to be the cleaning of the beaches carried out with mechanical means. These interventions, in fact, have a significant impact on the embryonic dunes belt both by removing the pioneer plants and by leveling their natural morphology, therefore negatively impacting the flora and fauna. Added to this the systematic removal of decaying wood improves the use of the seaside resort. These are interventions which, although strongly discouraged by national guidelines (Buffa et al., 2022), are still heavily carried out by numerous public administrations.

It is an umbrella species, and as the only saproxylophagous elaterid present in the Italian dunes plays a fundamental ecological role. Its conservation must be perceived as a priority by the competent authorities and the application of current guidelines (Buffa et al., 2022). In conclusion, for the correct management of the beaches the guidelines can no longer be systematically avoided.

Figure 5. Santa Maria del Focallo beach, July 2022, as it appears after cleaning carried out with mechanical means.
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REFERENCES


